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ANALYSIS OF MANNING OPTIONS FOR VISIT, BOARD, SEARCH, AND SEIZURE TEAMS

by

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June 2015

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This research explores the viability of qualifying and manning Visit, Board, Search, and Seizure (VBSS) teams with Marine infantrymen from the Marine Expeditionary Unit (MEU) that are deployed with amphibious readiness groups. The VBSS element is an area that needs to be certified for surface combatants before deployment, and is required according to the Required Operational Capabilities, Projected Operational Environment, but it consumes time, material, and personnel from multi-mission naval ships. The sailors who execute VBSS do so as collateral duty, and the missions are considered evolutions (temporarily manned watch stations). This results in VBSS teams that are insufficiently trained and not performing the mission as described in the Navy Tactics, Techniques and Procedures 3–07–11M Maritime Interception Operations (MIO). The author used an analytical approach that the Combined Maritime Forces could use to assign Marine VBSS teams to ships tasked with MIO. The findings of this research recommend the elimination of sailors in the execution of Required Operational Capabilities element Missions of State 4.4 (VBSS mission). It is further recommended to use MEU Marines to execute the VBSS mission onboard surface combatants.

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ANALYSIS OF MANNING OPTIONS FOR VISIT, BOARD, SEARCH, AND SEIZURE TEAMS

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ABSTRACT

This research explores the viability of qualifying and manning Visit, Board, Search, and Seizure (VBSS) teams with Marine infantrymen from the Marine Expeditionary Unit (MEU) that are deployed with amphibious readiness groups. The VBSS element is an area that needs to be certified for surface combatants before deployment, and is required according to the Required Operational Capabilities, Projected Operational Environment, but it consumes time, material, and personnel from multi-mission naval ships. The sailors who execute VBSS do so as collateral duty, and the missions are considered evolutions (temporarily manned watch stations). This results in VBSS teams that are insufficiently trained and not performing the mission as described in the Navy Tactics, Techniques and Procedures 3–07–11M Maritime Interception Operations (MIO). The author used an analytical approach that the Combined Maritime Forces could use to assign Marine VBSS teams to ships tasked with MIO. The findings of this research recommend the elimination of sailors in the execution of Required Operational Capabilities element Missions of State 4.4 (VBSS mission). It is further recommended to use MEU Marines to execute the VBSS mission onboard surface combatants.

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LIST OF ACRONYMS AND ABBREVIATIONS

A School	Advanced School
AAV	Approach and Assist Visit
AOR	Area of Responsibility
ATG	Afloat Training Group
CG	Cruiser
CMF	Combined Maritime Forces
COA	Course of Action
COMNAVSUFRLANT	Commander Naval Surface Forces Atlantic
COMNAVSURFPAC	Commander Naval Surface Forces Pacific
CTF	Combined Task Force
DDG	Destroyer
ESG	Expeditionary Strike Group
FRTP	Fleet Replacement Training Plan
IAW	In Accordance With
IET	Intelligence Exploitation Team
IPATS	Interdiction Patrols
JFMCC	Joint Forces Maritime Component Commander
JP	Joint Publication
MARSOC	Marine Corps Special Operations Command
MEU	Marine Expeditionary Unit

MIO	Maritime Interdiction Operations
MOS	Missions of State
MRF	Maritime Reaction Force
NCB	Non-Compliant Boarding
NEC	Navy Enlisted Code
NEIC	Navy Expeditionary Intelligence Command
NM	Nautical Mile
NTTP	Navy Tactics Techniques and Procedures
OPBOX	Operational Box
OPNAVINST	Commander Naval Operations Instruction
RHIB	Rigid Hulled Inflatable Boat
ROC POE	Required Operational Capabilities and Projected Operational Environment
SRF	Ships Reaction Force
VBSS	Visit, Board, Search, and Seizure

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I. INTRODUCTION

Traditional missions of cruisers and destroyers are air warfare, surface warfare, and antisubmarine warfare, but in fact, Visit, Board, Search, and Seizure (VBSS) as part of the primary missions of state (MOS) warfare area is accomplished more frequently than most other missions. In today's Navy of billion dollar, multi-mission platforms, VBSS does not clearly stand out at the top of the priority list for manning, training, and equipping.

A. BACKGROUND

Despite a vast international effort, piracy is still a major problem for commercial shipping (Millen, 2014). Consequently, the demand for the VBSS mission remains very high in the regional hotspots of the world. A shipmaster working with Dryad Maritime reported that only 25% of commercial ships took advantage of the benefits of basic physical and visual deterrents during transits through the Gulf of Aden (Edey, 2014). By 2008, the insurance cost to transit through the Gulf of Aden was USD 20,000 for each commercial ship (Valencia & Khalid, 2009). In 2014 alone, there were 10 attacks by pirates in the Maritime Security Patrol Area for the Combined Maritime Force (CMF), which is an area of high military activity; therefore, using VBSS could have reduced the occurrence of these pirate attacks. VBSS missions are the primary source for deterring and defeating piracy and drug trafficking, and CMF reports that only an estimated 4.5% of heroin produced in Afghanistan to fund terrorism was interdicted in 2014 (Command Maritime Forces [CMF] Overview, n.d).

Even though piracy is an issue in the CMF area of responsibility (AOR), it is not the only issue. An antiterrorism program manager for the Center for Security Forces noted, "Although antipiracy operations are getting significant news coverage, VBSS teams are not specifically trained for an antipiracy mission" (Barker, 2009). This occurs because CMF is responsible for antiterrorism as well, which can span many different types of VBSS boardings.

1. Problem

Although the demand remains high for these specialized teams, the priority that the Navy places on manning, training, and equipping them is low in relation to the other primary mission areas. The program itself is not the problem, the amount of piracy events that have taken place where VBSS tactics have been employed have declined, in 2013 there were no ships that were successfully hijacked ("Somali Pirates Driven Off in First Attack," 2014).

Ships are required to maintain two VBSS teams, each consisting of six sailors and two alternates, who perform the VBSS function as collateral duty. Maintaining the status quo on board each deployable Navy ship leads to degradation in the mission area because of the higher levels of emphasis placed on different mission areas for training. Only 5.1% of sailors on VBSS teams reported that they were able to participate in VBSS training on a regular basis, but more than 80% of sailors participated in the actual VBSS operations (Ray, 2010).

The Center for Security Forces that trains the Navy's VBSS teams, reports above-average failure rates at the San Diego, CA, and the Chesapeake, VA, training centers (Table 1). The attrition rates have recently begun to decline because the curriculum at each training center has changed and requirements have been relaxed. The new requirements include less physical training and more technical training (T. Sanderlin, personal communication, February 23, 2015).

	Chesapeake, VA	San Diego, CA
FY 2011	16.9%	36.3%
FY 2012	16.2%	16.3%
FY 2013	13.4%	16.3%
FY 2014	12.8%	24.99%

Table 1. Fiscal Year (FY) Attrition Rates for East and West Coast VBSS Schools (Sanderlin, 2015)

As a former training officer, I have personally gone through the process of manning, training, equipping, and certifying two different VBSS teams. This process takes time and effort from the entire ship's company. The commanding and executive officers have to be involved from the beginning to stress the importance of identifying adequate personnel. The weight of their positions ensures junior officers tasked to build the team to direct higher ranking department heads to make the difficult decisions on manning the teams and giving up valuable time to conduct training. The department heads must find personnel that not only meet the physical fitness, weapons qualification, and swimming requirements, but they must also give up that person for an unforeseen time during the certification phases, work-up cycle, and deployment. Division officers must then manage their divisions and maintain their equipment with fewer people during the 9-week training for each member to become fully certified in VBSS in addition to VBSS team training, VBSS certification, and actual VBSS operations. During training intervals, the work requirements of the VBSS personnel are assigned to other members of the division.

2. Thesis Statement

The VBSS mission is critical in the safety, security, and stability of the Middle Eastern region, but because the crews on multi-mission platforms have many other priorities, the investment of the necessary amount of time for VBSS training is less than optimal. Conversely, the Marine Corps' priorities from the beginning of their training and throughout the entire pipeline more closely align with the combat-intensive nature of the VBSS warfare area.

3. Benefits of this Study

The outcome of this study demonstrates that transferring the VBSS mission to the Marine Corps is achievable, and that the Marines have the appropriately qualified personnel to support this mission. This more closely aligns the Marine Corps to their roots as directed in the Resolution of the Continental Congress on November 10, 1775:

> Resolved, that two Battalions of Marines be raised consisting of one Colonel, two Lieutenant Colonels, two Majors & Officers as usual in other

> regiments, that they consist of an equal number of privates with other battalions; that particular care be taken that no persons be appointed to office or inlisted into said Battalions, but such as are good seamen, or so acquainted with maritime affairs as to be able to serve to advantage by sea, when required.

Relieving the Navy of this boarding mission will better support the manning and training priorities onboard ships to be aligned with given instructions. These changes will allow commanding officers and crew to focus on readiness in all warfare areas.

B. RESEARCH QUESTIONS

1. Primary Research Question

(1) What alternatives are available to conduct VBSS in the U.S. Navy?

2. Secondary Research Questions

(1) What is the appropriate quantity and quality of Marine manpower to comprise a VBSS team?

(2) How would an analytical approach efficiently allocate these Marine VBSS teams to ships that are assigned a VBSS mission?

C. METHODOLOGY

The manpower and training requirements for Navy VBSS teams will be used to review and compare MOS, based on Navy and Marine Corps publications and instructions. An analytical approach will be developed to examine the capabilities and limitations of the Marine Expeditionary Unit (MEU) and Expeditionary Strike Group (ESG) afloat in the area of operations to refine the parameters of the analytical approach. In addition, an analytical assessment will answer research questions and show courses of action costs and benefits.

D. THESIS ORGANIZATION

Chapter I is an introduction that will serve as background to the scope of the thesis. It will present the issue and benefits along with stating the research questions of

this thesis. Specifically, this section will state the importance of the VBSS mission and the problems with the current program.

Chapter II will provide background on the VBSS mission area as well as the certification process. In particular, the certification process on cruisers and destroyers and the effect that this process has on the other warfare areas. It will also give background into the Marine Corps' and the Navy's training pipelines as a basis for explaining which service is more appropriately trained for VBSS from the beginning.

Chapter III is a literature review that will summarize pertinent documentation for insights into the depth and magnitude of VBSS operations and give the best possible recommendations to improve it. Specifically, it will review other theses that have been expanded upon and used to substantiate this thesis. Also, this section will explain the instructions that were used to analyze the research questions.

Chapter IV will present the requirements and development of the thesis analytical approach along with the actual approach. Solutions to the model and an explanation of the model results will be provided.

Chapter V will provide a summary, conclusion, and recommendations based on the results of the literature review and the model. In conclusion, the strengths and weaknesses will be explored for three courses of action presented for further research.

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II. BACKGROUND

A. MANNING

1. Marine Training Pipeline—"Every Marine is, First and Foremost, a Rifleman"

Every U.S. Marine begins boot camp training with performing drills, physical endurance exercises, field maneuvers, defensive driving, first aid, close combat skills, and, last but not least, marksmanship. After boot camp, Marines that are selected for the 0300 occupational field, infantry, go to the Marine Corps School of Infantry. At this school, Marines learn combat marksmanship, patrolling, grenade usage, military operations in urban terrain, tactical formations, and continue to advance in the Marine Corps Martial Arts Program ("Recruit Training," n.d.). About 1100 Infantry Marines make up the Ground Combat Element of the Marine Expeditionary Unit (MEU).

In addition to the Marine Corps School of Infantry (SOI), Marines that are selected for special operations attend Marine Corps Special Operations School, Individual Training Course. During this intense training, candidates go through a four-phase training that can be compared with what the Navy Sea, Air, Land (SEAL) Special Forces go through; currently, the Navy uses SEALs to conduct level IV, or hostile, boardings. The Marine Corps training, taken from the Marine Special Operations Command (MARSOC) website is as follows.

> Phase 1 – (Basic Skills) 10 Weeks: Phase 1 trains and evaluates students in the basic skill sets required of all special operators. Physical fitness, swimming and hand-to-hand combat are stressed in a physical training] program designed around endurance, functional fitness and amphibious training. This physical training program will continue throughout the course and has been designed to prepare the student for the unique demands of special operations. Field skills including: navigation, patrolling, Survival, Evasion, Resistance, and Escape (SERE), Tactical Combat Casualty Care (TCCC). Mission planning, Fire support training and Communications round out the first phase.
>
> Phase 2 – (Small Unit Tactics) 8 Weeks: Phase 2 builds upon the foundation of Phase 1, training the student in small boat and scout swimmer operations, crew served weapons, demolitions, photography and

information collection and reporting. Students will be evaluated in two Full Mission Profile exercises "Operation Raider Spirit," a 2-week exercise focused on patrolling and combat operations, and "Operation Stingray Fury" focused on urban and rural reconnaissance.

Phase 3 – (Close Quarters Battle) 5 Weeks: Student will be trained in rifle and pistol combat marksmanship and will then learn the tactics, techniques and procedures need to serve as a member of a Marine Special Operations Team during assault operations. This Phase culminates in a series of full mission profile precision raids on rural and urban objectives during "Operation Guile Strike."

Phase 4 – (Irregular Warfare) 7 Weeks: In the final phase, students will receive instruction on Irregular Warfare operations. The course culminates with "Operation Derna Bridge." Derna Bridge will require the student to use all of the skills mastered throughout the course while training, advising and operating with a Partner Nation/Irregular force. Newly graduated MARSOF CSO's will be assigned to one of the three Marine Special Operations Battalions. ("MARSOF Individual Training Course (ITC)," n.d.)

2. Navy Training Pipeline—"Every Sailor is a Fire Fighter"

The Navy's 8-week boot camp centers on physical training and indoctrination to life onboard a ship, with battle stations, first aid, basic seamanship, and firefighting. Only 1 week is dedicated to weapons training on the M-16 and 12-gauge shotgun ("Navy Boot Camp," n.d.). After boot camp, most sailors continue onto their assigned technical school or advanced school (A school). Most A schools do not provide any further combat training, only technical training for each sailor to learn his or her own rate.

Normally, the sailors will then transition to their assigned ship; once they arrive, there is a chance they could volunteer or be selected for the VBSS team. Selection is usually based on physical fitness because the prerequisites are mostly centered on the physical readiness test, swim qualifications, and the ability to climb a 30-foot Jacob's ladder in full gear. Once selected for the team, they attend Security Reaction Force (SRF)-Basic (SRF-B) School, which has recently transitioned from being taught in an actual school to an onboard ship training that occurs during orientation. The next two schools are taught in accordance with Chief of Naval Operations Instruction (OPNAVINST) 3591.1F by the Center for Security Forces (CENSECFOR). The first

course is SRF-Advanced (SRF-A), which is more in-depth shipboard, pier, or small boat combat training. Then they are enrolled in Non-Compliant Boarding, Visit, Boarding, Search, and Seizure (NCB-VBSS), which covers compliant and noncompliant boardings, more tactical weapons training, ladder climbing, rappelling and containerized inspection, tactical maneuvers, intelligence gathering, nonlethal weapons, mission planning, effective communications, combat first aid, and prisoner escort. This is the final school for a VBSS team member, but every VBSS team must have a boarding officer who must attend boarding officer VBSS School. This school is before NCB-VBSS and is normally reserved for service members ranked Chief Petty Officers and above. Last is the mechanical breacher VBSS. This school is for sailors from the engineering department and teaches them how to breach a variety of doors or walls.

A full curriculum description given in the Appendix shows that this VBSS training is more closely aligned with the training that an Infantry Marine receives throughout his or her career. As stated previously, the Center for Security Forces has had to relax its standards and reduce the amount of physical training to decrease attrition rates, which may lead to ability degradation in VBSS teams.

The Navy defines special skills and abilities for enlisted occupations using a system of ratings. Each sailor trains toward a specific rating and additional VBSS training is not a part of a normal training pipeline for any of the Navy ratings. In order to attend these schools, it requires up to 9 weeks of additional non-in-rate training. During this time, the sailor is pulled from their watch section and daily duties. Because their work still needs to be accomplished, other personnel from the ships force must complete it in addition to their own duties. There are dozens of other critical schools for other warfare areas that must be attended, and most of these are part of sailors' training pipeline for their rate, but VBSS schools compound the manpower loss.

3. Manning Issues

In 2002, the Navy standard workweek was changed from 67 hours of work per week to 70 (Ewing, 2008). This meant that the same amount of work would be done on each ship with fewer personnel. This change in complement with optimal manning,

although technically discontinued, it is still the standard by which requirements are determined for ships and how they are manned today. There are 325,000 active duty members in the U.S. Navy as of 2015 ("Status of the Navy," n.d.), and the 2014 Quadrennial Defense Review calls for even further reductions in manning to 323,000 active duty personnel (Hagel, 2014).

In this reduced manning environment, every person on the ship is critical, and most have a critical Navy enlisted classification (NEC); moreover, some sailors are the only one aboard to hold a specific critical NEC. On a condition III (wartime/increased tension/forward deployed cruising readiness) watch bill, each watch station is accounted for and manned continuously. Ships are expected to maintain a condition III level of readiness for 60 days while making sure each sailor gets 8 hours of sleep every day. Because sleep is a requirement, each watch station may require three to four people to man it. The minimal manning for a VBSS team is two teams of six members; at any time, the ship could be ordered to conduct a boarding, and six specific people from the watch bill will need to be replaced by other qualified watch standers to conduct that evolution. This not only interrupts the continuity of that watch station, it potentially interrupts the sleeping, eating, or training routines of other watch standers. VBSS is different from the other shipboard evolutions such as flight quarters, because flight quarters is normally planned out at least a day in advance and does not require the sailors to leave the ship. VBSS operations can be ordered sporadically and take much more time to complete then other shipboard evolutions.

B. REQUIRED OPERATIONAL CAPABILITIES, PROJECTED OPERATIONAL ENVIRONMENT

1. Overview

The Required Operational Capabilities, Projected Operational Environment (ROC POE), OPNAV 3501.101E delineates primary and secondary missions for each platform. Because each platform has a unique ROC POE, the instructions for a destroyer (DDG) and cruiser (CG) will be referenced because they are more often assigned VBSS

missions. In addition, DDGs and CGs do not have Marines already embarked for deployments.

2. Mission Areas

Mission areas are capabilities that a specific ship was designed for and maintains, for example on a DDG-51 class Anti-Air Warfare and is assigned a P to delineate it as a primary warfare area. The Missions of State (MOS) warfare area is a primary warfare area and VBSS falls under it as a required operational capability, but there are also nine other primary warfare areas as shown in Figure 1. Manpower requirements for each ship are determined from the tasking given by all mission areas in a measurable amount of productive work (Guillory, 2003).

DDG 51 Class													
AAW	AMW	ASU	ASW	CCC	C^2W	FSO	INT	LOG	MIW	MOB	MOS	NCO	STW
P	P	P	P	P	P	S	S	S	S	P	P	S	P

AAW: Anti-Air Warfare
AMW: Amphibious Warfare
ASU: Anti-Surface Ship Warfare
ASW: Anti-Submarine Warfare
CCC: Command, Control, and Communications
C^2W: Command and Control Warfare and Information Warfare
FSO: Fleet Support Operations
INT: Intelligence
LOG: Logistics
MIW: Mine Warfare
MOB: Mobility
MOS: Missions of State
NCO: Non-Combat Operations
STW: Strike Warfare

Figure 1. Primary and Secondary Warfare Mission Areas for DDG 51 Class (Guillory, 2003)

A more current ROC POE from the CG-47 Ticonderoga Class has some of the warfare areas reorganized with the most up-to-date nomenclature, but MOS is still a primary warfare area and VBSS is still listed under it (Figure 2). This shows that between 2003, when the DDG-51 ROC POE instruction was promulgated, and 2014, when the CG-47 ROC POE came out, there has been no change to the requirements placed on the VBSS warfare area (Figure 2) (Fanta, 2014).

CG 47 Class														
AW	AMW	ASW	CCC	FHP	FSO	INT	IO	LOG	MIW	MOB	MOS	NCO	STW	SUW
P	P	P	P	S	P	S	P	S	S	P	P	S	P	P

AW: Air Warfare
AMW: Amphibious Warfare
ASW: Anti-Submarine Warfare
CCC: Command, Control, and Communications
FHP: Force Health Protection
FSO: Fleet Ship Operations
INT: Intelligence Operation
IO: Information Operations
LOG: Logistics
MIW: Mine Warfare
MOB: Mobility
MOS: Missions of State
NCO: Non-Combat Operations
STW: Strike Warfare
SUW: Surface Warfare

Note: Warfare area nomenclature was updated in the latest DDG-51 ROC POE as well, and coincides with the CG-47 warfare areas.

Figure 2. Primary and Secondary Warfare Mission Areas for CG 47 Class (Fanta, 2014)

C. FLEET REPLACEMENT TRAINING PROGRAM

1. Overview

Every Navy ship goes through a cycle called the Fleet Replacement Training Program (FRTP) in accordance with Commander Naval Surface Forces Pacific (COMNAVSURFPAC)/Commander Naval Surface Forces Atlantic (COMNAVSURFLANT) instruction 3502.3, Surface Force Readiness Manual. During this cycle, each mission area as assigned in the ROC POE is assessed for certification to deploy.

2. Phases

The cycle consists of five phases that continually repeat over a 27-month period. The cycle starts with the basic phase: all of the training, assessing, and certifying for individual ships happens during this phase and is broken into two tiers. Next are the integrated and advanced phases, in which group level training, assessing, and certifying take place. Once these three phases are complete, the sustainment phase starts, and includes deployment. During the sustainment phase, the ship's crew is expected to maintain proficiency and begin planning for the next basic phase. After the ship returns

from deployment, the fifth phase—maintenance—begins and the whole process starts over shown in Figure 3 (Thomas & Hunt, 2012).

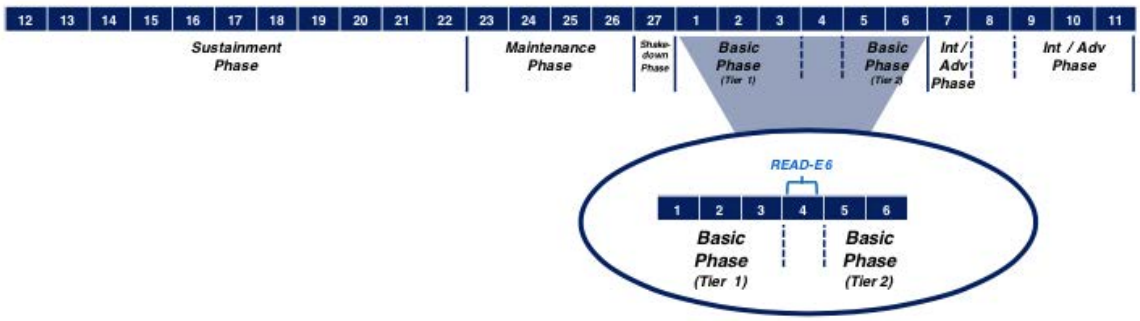

Figure 3. Fleet Replacement Training Plan (FRTP) Notional Schedule in Months (Thomas & Hunt, 2012)

D. OPERATIONS

1. Combined Maritime Forces

The area of operations for CMF spans more than 2.4 million square nautical miles (nm) of international waters that borders 18 countries and contains three strategic choke points: the Strait of Hormuz, Bab al Mandeb, and the Suez Canal. CTF 150 specifically operates in a 450 nm span called the Maritime Security Patrol Area (Figure 4). More than $950 billion of trade passes through these choke points every year, with 33% of seaborne-traded oil passing through the Strait of Hormuz (SoH) alone. This area of operations also contains more than 60% of the world's crude oil and natural gas reserves and more than 30% of the world's crude oil and natural gas production (Combined Maritime Forces).

CMF is made up of three smaller task forces: Combined Task Force (CTF) 150, 151, and 152. These task forces are made up of a coalition of up to 60 different countries, and each one has a unique mission. CTF 150 is for counterterrorism and specifically targets vessels that are trafficking narcotics in order to cut off funding to terrorist organizations. This CTF also conducts intelligence patrols, where VBSS teams board a variety of vessels to gain intelligence on terrorist activities. The mission of CTF 151 is counter-piracy. U.S. ships are normally not under the tactical control of CTF 151 unless a

piracy event is occurring. Last, CTF 152 is also concerned with counterterrorism, but specifically in the Arabian Gulf, and more specifically working to create interoperability with the members of the Gulf Cooperation Council (GCC).

This thesis will concentrate on CTF 150 because it is the task force that U.S. ships are normally assigned to on a regular basis. They are also more extensively involved in day-to-day VBSS operations. CTF 150 was established in 2002 with a mission to, "Disrupt terrorist organizations and associated traffics by restricting their freedom of maneuver in the maritime environment." This task force mainly disrupts terrorism by interdicting vessels carrying drugs. United Nations Office on Drugs and Crime (UNODC) figures show that Afghanistan alone produces about 460,000 kg of heroin and hashish every year, and in 2014, CTF 150 seized more than 21,000 kg of these drugs, which equates to about $54 million (Figure from a PBS special report was $2,600/kilo) (CMF Overview, n.d.).

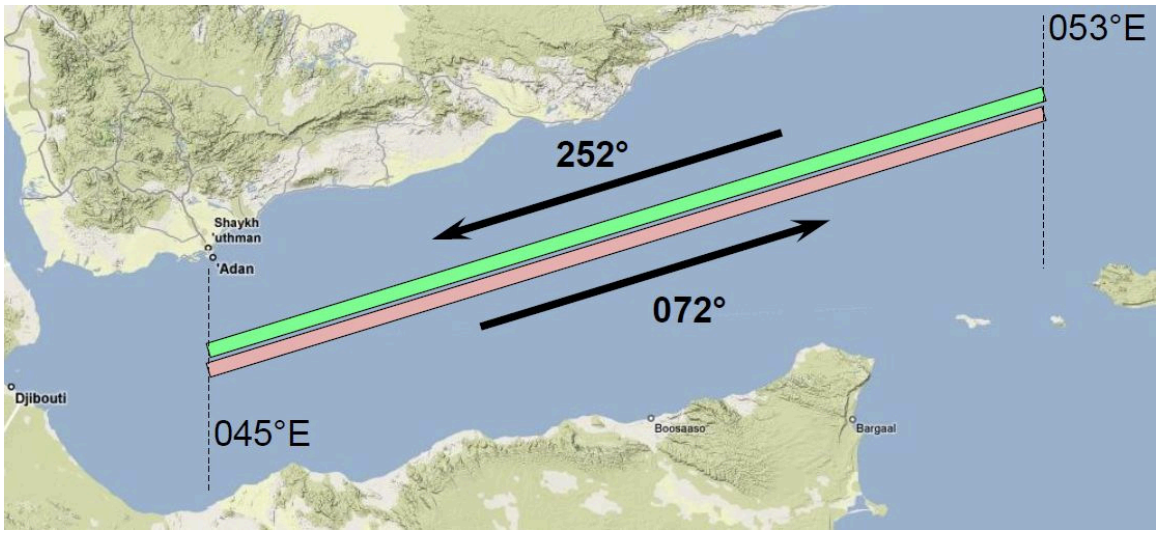

Figure 4. CTF 150 Maritime Security Patrol Area East and Westbound Routes (Combined Maritime Forces)

2. Marine Expeditionary Units Requirements

The Marines deploy as a Marine Expeditionary Unit (MEU), which consists of a ground, aviation, and logistics combat element. The ground combat element has three rifle companies and one weapons platoon, which is about 1200 Marines.

There is much less documentation to dictate the day-to-day workload for the Marines while they are deployed with the MEU. Specifically looking at the duties of the infantrymen, their main job is to maintain the equipment onboard as well as their combat skills. They are also required to maintain a 6-hour response time—"flash to bang"—meaning once an operational capability is required, the MEU has 6 hours to execute a response.

Space onboard a deployed ship is in high commodity, and Marines must find space to conduct their close combat training and martial arts programs. Aside from maintaining their skillset, there are no other requirements for the Marines to perform aboard a ship. The actions carried out in each VBSS boarding contributes toward maintaining these required skills.

3. Expeditionary Strike Group

ESGs normally deploy with three amphibious ships, the landing helicopter assault ship or the landing helicopter dock ship, a landing platform dock ship, and a dock landing ship. The Landing helicopter assault ship or landing helicopter dock ship has a large deck (or aircraft carrier) component that carries most of the aircraft, which includes an estimated load out of 12 CH-46 Sea Knight helicopters and four CH-53 Sea Stallion helicopters. The range of a CH-46 is about 600 nm and has a capacity of 24 troops with their gear; the CH-53 has a range of about 540 nm and can carry 38 troops with their gear. The CH-46 will be used to analyze the transport of the Marine VBSS teams ("Expeditionary Strike Group," 2011).

The concentration of an ESG deployment is to provide amphibious shore assault capabilities for contingency operations. ESGs are often very helpful in humanitarian assistance and disaster relief (HA/DR) because of the high volume of transportation assets available.

4. Evolutions

While underway, the personnel on the ship are assigned watch stations, which are delineated in a watch bill; these stations are to be manned 24 hours a day, 7 days a week. In addition to the underway watch stations, there are also special evolution watch bills, which are only enacted while that evolution is taking place. Evolutions are defined as being a temporarily manned watch station. The personnel that are used to man the special evolution stations are also on the regular watch bill, so while that special evolution is occurring, a replacement watch stander must be used.

Each ship is responsible for constructing a unique underway watch bill; as a result, the effect of pulling members from watch stations to participate in a VBSS evolution is different for each ship. The one reoccurring issue is that the disruption caused by special evolutions takes away from the continuity of a watch station and the effectiveness of the watch stander.

Also, VBSS is not the only evolution that these ships are required to perform—other evolutions such as flight deck operations, well deck operations (for amphibious ships), and boat deck operations require qualified individuals, training, and execution. Some personnel are on multiple evolutions, such as VBSS, flight quarters, navigation detail, and mine watch. What happens when the VBSS team is out and emergency flight quarters is called—and sailors that need to be there for the emergency flight quarters are on the VBSS team? The ability for the ships to conduct the emergency landing of a helicopter will be degraded.

5. Types and Levels of VBSS Boardings

VBSS boardings serve many purposes, from peaceful rescue and assistance operations to noncompliant, hostile marine interdictions. There are four levels according to Navy Tactics, Techniques, and Procedures (NTTP) 3–07.11M, and these refer to the level of resistance that is anticipated in the boarding (Salerno & Jewett, 2008).

1. Level 1: Compliant boarding
2. Level II: NCB, in which embarking the suspect vessel can be accomplished by rigid hull inflatable boat (RHIB) or similar small craft

3. Level III: NCB, in which embarking the suspect vessel requires helicopter insertion or specially trained and equipped forces

4. Level IV: Opposed boarding

U.S. Navy VBSS teams are only qualified to conduct level II boardings. Among the level I and II boardings, there are different types of missions, which include approach and assist visits (AAV) and interdiction patrols (IPATS). The purpose of these missions is to provide assistance to vessels in distress, gain intelligence, and interdict the trafficking of suspicious substances.

E. DRAWBACKS

Among the VBSS missions, a goal of CTF-150 is to collect intelligence through AAVs and IPATS ("CTF-150 Maritime Security," n.d.). The "shoot first, ask questions later" culture of the Marines sometimes brings incompatibility with intelligence gathering. However, not even Navy VBSS teams are trained with the skills to collect intelligence, and often there is such a language barrier against which intelligence collection is not effective.

In addition, ships would be left without an organic VBSS team while not under the tactical control of CTF-150. Although this could be a concern, the ships could maintain qualified boat crews to conduct day-to-day operations other than VBSS, AAV, and IPATS. The ships are also required to maintain an SRF; these personnel attend SRF basic and SRF A school. The SRF is capable of protecting any U.S. Navy asset—meaning the ship would not be in danger of losing its capability to defend against an enemy attempting to board it. The expertise of a qualified VBSS team is generally not needed at any time until under tactical control of a CMF command, such as CTF-150.

Last is the issue of logistics: getting the Marines to the ships that are assigned to CTF-150. CTF-150's AOR covers more than 2 million square miles in the Red Sea, Gulf of Aden, and Gulf of Oman. The Maritime Security Patrol Area is a more manageable strip of ocean in the Gulf of Aden that covers about 450 nm (Combined Maritime Forces).

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III. LITERATURE REVIEW

A. INTRODUCTION

Questions have been asked about the capabilities of the Navy's VBSS mission areas on ships that are affected when VBSS teams are manned with Navy personnel (Ray, 2010) (Rank, 2012). The results from the following three theses prove the need to provide options for changes in VBSS operations.

1. Identifying Capabilities Gaps in Shipboard Visit, Board, Search, Seizure (VBSS) Teams—Ray, 2010

This thesis concentrates on the prescribed mission of the VBSS teams and the gaps in capabilities based on surveys and documentation. A 17-question survey was given to 10 randomly selected ships: three from Naval Station Norfolk, three from Naval Station San Diego, two from Naval Station Mayport, and two from Naval Station Pearl Harbor. The mix of ships surveyed was two CGs, two DDGs, two frigates, two dock landing ships, and two amphibious transport docks (landing platform dock ships). Of the ships contacted, five commanding officers responded. Of a potential 105 responses, 45 sailors participated. Keeping in mind that this information may be slightly biased by the fact that the personnel that chose to respond did so because they had grievances to voice, the results showed that VBSS teams are negatively affected by manning issues and that personnel are not able to train to the standards required for this warfare area.

The results from the survey showed that 87.1% of the responses reported that manning had a negative impact on VBSS training opportunities, whereas only 45.2% said that manning had a negative effect on actual operations. This means that the ships had to make different decisions concerning manning when it came to training and operations. One way to see how the manning is managed is to look at the underway watch bills. These are documents that are promulgated and normally signed by the commanding officer to direct each sailor on what his or her watch station is while underway. Normally, no one is left off the watch bill and, because VBSS is an evolution, sailors are pulled from their watch stations to participate. When asked if the underway watch bills are set

up to allow members to participate in VBSS training on a regular basis, 94.9% of the responses were “no” or “sometimes.” This means that only about 5% of personnel were given the opportunity to train for this dangerous operation on a regular basis. On the other hand, when asked whether underway watch bills were set up to allow members to participate in actual operations on a regular basis, 82.1% responded “yes” or “sometimes.”

These disparities between training and actual operations show that ships might not be properly manned to be able to prioritize the VBSS mission area. The conclusion and recommendations of this thesis were: (1) to use embarked units to conduct the VBSS evolution and, (2) to bolster VBSS training while underway by using a deployable mission trainer. The author provided examples of other embarked units that the Navy already uses such as explosive ordinance disposal and information exploitation teams (IETs). The examples showed that there was already a mechanism in place to distribute these embarked units and that using it was a viable option.

2. Manning Issues Involving Visit, Board, Search, and Seizure (VBSS)—Rank, 2012

This thesis dealt exclusively with the manpower issues. The author looked at ships being forced to compromise between sailors operating under their primary NECs or the VBSS mission, whether in training or operations. Rank went provided an in-depth look at what the VBSS training requirements are, both in the amount of time and the prerequisites required. The main purpose behind this thesis was to analyze of the strengths, weaknesses, opportunities, and threats of current VBSS teams and of various other options.

An overview of Rank’s findings includes positives and negatives for both sides of the problem. One strength of keeping the VBSS teams as an organic shipboard entity would be the flexibility that comes with the consistency of training and evaluation across all deployable surface vessels. Piracy is an age-old problem, but the relatively recent severity of this issue—and the undisputed success of the coalition’s antipiracy efforts—show that the Navy’s VBSS program is not a failure. Another strength is that the diversity

achieved by manning a VBSS team with many different technical backgrounds increases the team's capabilities. The weaknesses are large, however: lack of training and manpower can be a hurdle for any team to overcome. The lack of training has already been covered, but the lack of manpower can be expressed further, as follows.

> There are a total of 141 Navy ships that retain the capability to conduct VBSS operations anywhere around the world. Multiplying 141 by the number of boarding personnel required (12), results in approximately 1,692 sailors trained to conduct VBSS operations in the Navy's fleet. A majority of these sailors are rated and fulfill mission critical Navy Enlisted Codes (NEC), requiring them to be onboard to focus on mission critical equipment (Rank, 2012).

This statement was from 2012; since then, both the Marines and the Navy are being called upon to further decrease their manpower.

3. Marine Corps Drawdown, Force Structure Initiatives, and Roles and Missions: Background and Issues for Congress—Feickert, 2014

As the Marine Corps downsizes its total end strength from 202,000 personnel in 2011 to 174,000 by 2017, the need to redefine and restructure the current forces is crucial.

> A sampling of academic discussions focusing on the Marine Corps of the future suggests the Marines and Special Operations Forces (SOF) could be given the lead responsibility for worldwide ground engagement. Another proposal suggests that Marines should operate in small, decentralized units and that the Marines' Focus could shift to company and battalion-sized units, the so called "sweet spot" for joint ground forces (Feickert, 2014).

In his study, Feickert also cites an article by the Center for Strategic and Budgetary Assessments that proposes the Marines should be operating in smaller, more independent units, and that these smaller units could deal with "pirates and small non-state terrorist organizations and would be well-suited for conducting raids and other short duration operations." In addition, the Marine Special Operations Command (MARSOC) has been evaluating more efficient ways to restructure. An initiative has been started to begin deploying special operation forces with MEUs.

Another option this study discusses is to create a littoral operation Marine Air Ground Task Force that would have a rifle company embarked on an amphibious ship as well as two to three fast frigate ships. These are a relatively new concept and are not intended to be multi-mission platforms. Each warfare area in which this type of ship performs must be onloaded in a mission package. Further research would be needed to determine if the fast frigates could accomplish VBSS boardings along with a prescribed mission.

B. OPNAV 3501.101E DDG-51 ROC POE

According to the DDG-51 ROC POE, Missions of State (MOS) mission area, VBSS is required to be F/E in condition III steaming and L/E in condition I—this means that in condition III (readiness condition for wartime steaming), the ship must have a temporarily manned team (E) with full capability (F) in VBSS. In condition I (general quarters, each sailor at his or her battle station), the ship must be temporarily manned with limited capability (L) in VBSS shown in Figure 5.

DDG 51 CLASS	I	III	IV	V
MOS 4—PERFORM INTERDICTION.				
• MOS 4.4 Conduct Maritime Interception Operations (MIO) and or Visit, Board, Search and Seizure (VBSS) operations with naval/combined /joint forces. B. C. NOTE: DDG capable of initial MIO/VBSS operations. However, ship unable to maintain sustained operations or security team without support of MIO Detachment. D. E. I(L) - Requires standing down selected watch stations, unless MIO Detachment is embarked. F. • V(L) - Plan and train.	L/E	F/E	F/E	L

Figure 5. DDG VBSS/MIO ROC (Guillory, 2003)

C. COMNAVSURFPAC/COMNAVSURFLANT INSTRUCTION 3502.3: *SURFACE FORCE READINESS MANUAL*

All of the warfare areas on a ship must go through one form of certification or another prior to deployment. The Fleet Replacement Training Plan (FRTP), which is a cycle that each ship goes through, from maintenance availabilities through the sustainment phase, is shown in Figure 6. The DDG 51 class has 21 different warfare areas that are assessed in the unit tactical, basic phase, of the FRTP (Thomas & Hunt, 2012).

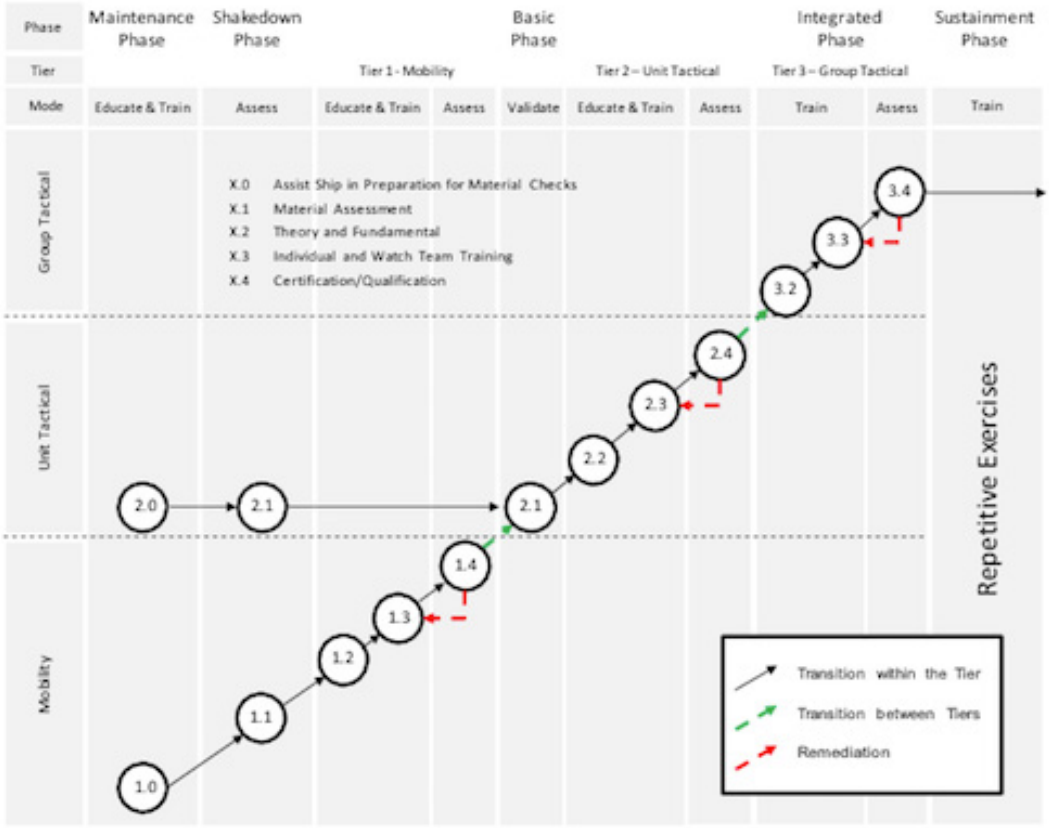

Figure 6. Training Continuum (Thomas & Hunt, 2012)

The VBSS warfare area is shown in the unit tactical area of Figure 5. There are four stages: 2.1 is the administrative assessment, and 2.2–2.4 are the classroom through certification stages. According to the Afloat Training Group (ATG) San Diego, most of the ships face difficulties in passing the administrative phase. The ATG believes this

happens because VBSS is not a very high priority in relation to the other warfare qualifications, such as firefighting or missile systems. In the administrative assessment, the officers in charge of VBSS must show that each team member has a current gun and swim qualification and has successfully been through all of the VBSS training. Because all of these qualifications require extensive planning, they often are difficult to maintain when the officers in charge of VBSS have other positions and warfare area certifications to manage as well. Because of this extensive certification process, the requirements listed in the ROC—that make VBSS an evolution because it is temporarily manned instead of an actual mission area—are in direct contrast with directives in the *Surface Force Readiness Manual*. Exercise requirements that must be assessed satisfactorily for a ship to pass the basic phase and be considered ready to deploy are shown in Table 2 (Beaver & Kitchener, 2012).

Number	Exercise Name	Amplification
01	Review VBSS Administration	IAW applicable Mission Area references
02	Demonstrate Level Of Knowledge (LOK)	IAW ATG LOK Exam Matrix (AVG >= 80%)
03	Conduct Non-Compliant Boarding Operations	Min 1 Team RHIB may be required for Hook and Pole
04	Conduct Compliant Boarding Operations	Min 1 Team
05	Conduct Approach/Maritime Influence Operations	Min 1 Team RHIB may be required for Hook and Pole
06	Conduct Detainee Operations	COND III, V: Ship Wide

Note: IAW – In Accordance With, ATG – Afloat Training Group, LOK – Level Of Knowledge

Table 2. Required Exercises for VBSS per the *Surface Force Exercise Manual* (Thomas & Hunt, 2012)

In addition to the exercises reviewed by ATG for shipboard VBSS certification, exercises must be done periodically to maintain this skillset (Table 3). These are considered special evolutions and require the personnel assigned to the VBSS team to suspend their daily work to participate. The evolutions require that ships have VBSS training team, which is a group of organic (stationed onboard) qualified VBSS members that are responsible for conducting and assessing shipboard training mentioned previously. The ATG is responsible for assessing and certifying the VBSS team as well as the VBSS training team, and they require, according to *the Surface Force Readiness Manual* and *Surface Force Exercise Manual*, VBSS pre-training visits. A pre-training visit is an informal pre-assessment for a warfare area in which the ATG team comes out to the ship and conducts the certification without the possibility of reporting a failure. These pre-training visits are helpful, but can also mean that each warfare area, including VBSS, technically gets assessed twice and sometimes even three times when multiple visits are required. Each pre-training visit can take an entire day to complete, and require all 14 members of the VBSS team to be present (Beaver & Kitchener, 2012).

Number	Exercise Name	Amplification	Frequency (days)
01	Conduct Non-Compliant Boarding Operations	Min 1 Team RHIB may be required for Hook and Pole	180
02	Conduct Compliant Boarding Operations	Min 1 Team	180
03	Conduct Approach/Maritime Influence Operations	Min 1 Team May require RHIB for Hook and Pole	180
04	Conduct Detainee Operations	Min. 2 fully qualified Boarding Team Members, Ship's Detainee Handling Team.	180

Table 3. Required Respective VBSS Exercises (Thomas & Hunt, 2012)

D. NTTP 3–07.11M

The U.S. Navy follows the Navy Tactics, Techniques, and Procedures, (NTTP) 3–07.11M to train, equip, and employ current VBSS teams. There are dozens of prescribed capabilities that these VBSS teams, manned with sailors that are participating as a collateral duty, must be able to accomplish. Some of these capabilities are shown in Table 4 (NTTP 3–07.11M) (Salerno & Jewett, 2008).

Boarding Team Skillset	Force Protection/Security Force
	Medical and Casualty Treatment
	Navigation and Seamanship
	Engineering and Stability (Hull, Mechanical, and Electrical)
	Chemical, Biological, and Radiological Exposure and Detection Skills
	Second Class Swimmer
	Language Proficiency
	Information/Material Assessment

Table 4. NTTP 3–07.11M Boarding Team Skillset (Salerno & Jewett, 2008)

As extensive as this list looks, the teams that are responsible for performing these functions are not able to practice them on a routine basis, according to a survey conducted by Kevin Ray of the Naval Postgraduate School (Ray, 2010).

IV. ANALYTICAL APPROACH

A. BACKGROUND

Whenever a major change with VBSS is proposed, it is necessary to determine if change can even be accomplished. By developing this analytical approach, a framework is being provided to determine whether to move forward or decide that the change is not worth the cost or effort.

The tables and figures presented previously provide information that determines requirements for manning, training, and certifying VBSS teams. This analytical approach takes into account the information for equipment, ranges, personnel and capabilities, but there can be more constraints and restraints that can be added in for future research for a full transition to an exclusively Marine Corps VBSS team.

B. DEVELOPMENT

The CH-46 helicopter was chosen to develop this analytical approach because of its distance range and capacity to carry personnel. (If another aircraft were to be considered, then the range in this analytical approach would have to be changed to accommodate the new parameters.) The CH-46 can carry an entire VBSS team and their gear to a distance of 600 nm. Because this helicopter can carry these personnel the entire distance of the 450-nm Maritime Security Patrol Area, it allows an adequate manpower supply to carry out the mission. This can be said for any aircraft that can equal or exceed the range and capacity of the CH-46.

Ships often operate within assigned boundaries called operational boxes (OPBOXs). In this approach, OPBOXs were developed to give a visual of how ships could be organized for personnel transfers (Figure 7). The distance between the boxes is the main constraint for feasibility of transfer, and this is where an analytical approach such as a mathematical model is useful. The OPBOXs labeled T_1, T_2, and T_3 are the target ships for assigning a VBSS mission requiring a Marine Corps VBSS team. The OPBOXs labeled SS_1 and SS_2 are the supply ships, or the ships that the Marine VBSS team would originate from.

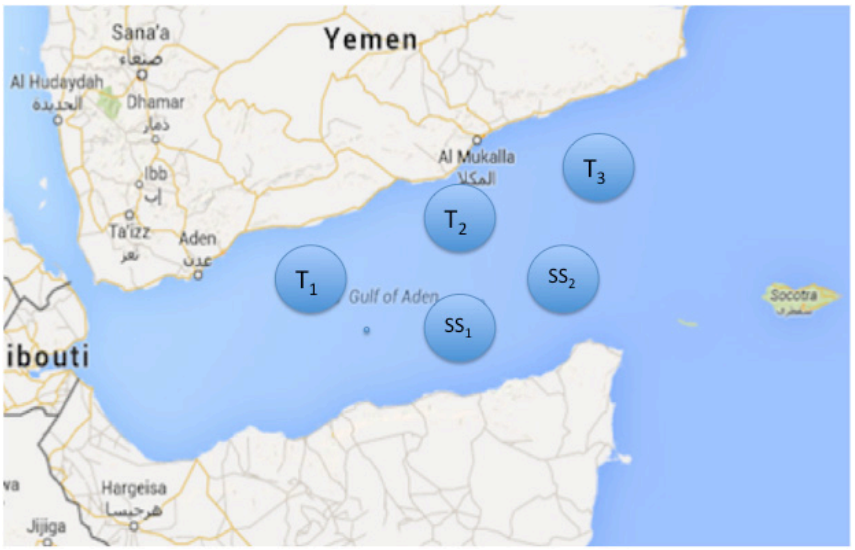

Figure 7. Map of Gulf of Aden with Operation Boxes

C. ANALYTICAL APPROACH

This analytical approach is developed with feasibility in mind. To express this approach, the following notations are used:

$$R = [\text{range of the aircraft in nautical miles (nm)}]$$

$$C_m = [\text{capacity of the aircraft for carrying personnel}]$$

$$C_e = [\text{capacity of the aircraft for carrying equipment}]$$

$$d(x, y) = [\text{distance between origin}]x\ [\text{and destination}]\ y$$

$$[\text{where}]\ x \in \{SS_1, SS_2, T_1, T_2, T_3\}\ y \in \{SS_1, SS_2, T_1, T_2, T_3\}, x \neq y$$

As mentioned previously, CH-46 was selected because of its past usage as a helicopter of interest for transferring VBSS teams from ship *x* to ship *y*. The capacity of CH-46 for personnel and equipment transfers—C_m and C_e—are more than adequate to carry necessary manpower and equipment. Therefore, the feasibility of such transfer exists. Because the range of the CH-46 when carrying personnel and equipment is 600 nm, choosing any other aircraft would change the range. The following conditions hold for any aircraft as long as,

$$R \geq 600$$

The feasibility conditions for an aircraft to reach the first destination without refueling should be that the total distance travelled is less than the range of the aircraft. The various cases for the possible routes are shown in Figures 8–11.

Case 1: From staging ship to target ship, one leg

$$d(SS_i, T_k) \leq R \qquad i = 1,2 \quad k = 1,2,3 \tag{1}$$

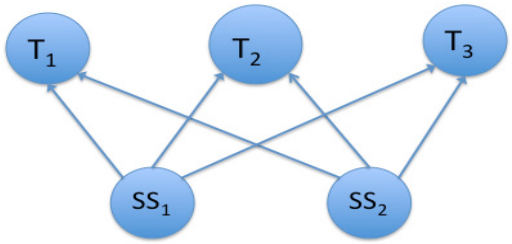

Figure 8. Examples of Distances Traveled by CH-46 in Inequalities: Case 1

Case 2: From one staging ship to another and then to the target ship, two legs

$$d(SS_i, SS_j) + d(SS_j, T_k,) \leq R \qquad i = 1,2 \quad j = 1,2 \quad k = 1,2,3 \quad i \neq j \tag{2}$$

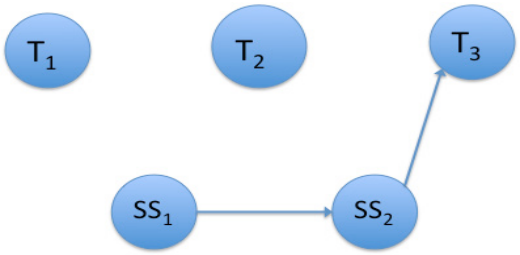

Figure 9. An Example of Distance Travelled by CH-46 in Inequalities: Case 2

Case 3: From staging ship to a target ship with a stopover at another target ship, two legs

$$d(SS_i, T_k) + d(T_k, T_l,) \leq R \qquad i = 1,2 \quad k = 1,2,3 \quad l = 1,2,3 \quad k \neq l \tag{3}$$

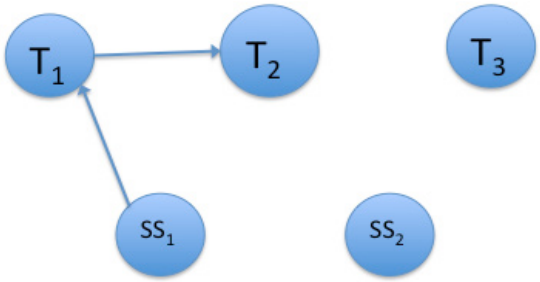

Figure 10. An Example of Distance Travelled by CH-46 in Inequalities: Case 3

Case 4: From one staging ship to another and then to a target ship with a stopover at another target ship, three legs

$$d(SS_i, SS_j) + d(SS_j, T_k) + d(T_k, T_l) \leq R$$

$$r = 1,2 \quad j = 1,2 \quad k = 1,2,3 \quad l = 1,2,3 \quad r \neq j \quad k \neq l \tag{4}$$

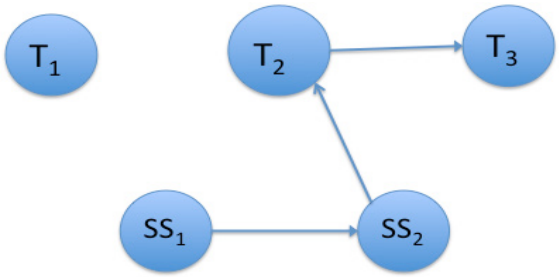

Figure 11. An Example of Distance Traveled by CH-46 in Inequalities: Case 4

Figures 8–11 illustrate the distances on the left hand side of inequalities (1)–(4). These distances are the distance travelled by CH-46 for pickups and drop-offs. Such maneuvers will be possible if the inequalities in each case are satisfied.

D. ANALYSIS

The inequalities shown here offer feasibility conditions in terms of distance traveled by the transportation craft and its range. Even if locations of staging ships change and the range of the craft changes in the future, the feasibility of inequalities (1)–(4) will enable the transfer of teams.

In addition, using this analytical approach, the user can apply more specific conditions that are in place for the target and supply ships to determine the most efficient option for the transport aircraft used. If the mode of transportation is a restriction, then that information can determine the most efficient staging of the ship that will be supplying the VBSS team. Expanding the types of ships that the VBSS teams will be transported to will add restrictions as some ships do not have the capability to land certain helicopters like the CH-46. In this case, the option to fast rope to the ship without the helicopter landing could alleviate this restriction.

Modifications such as originating points being onshore can easily be incorporated into this approach. Ground vehicles and aircraft will have their own feasibility conditions; however, they can be derived based on the primary feasibility conditions (1)–(4) given here. The capacities of the ground transportation may prove to be a bottleneck in such modifications, for example.

The outcome of this analytical approach allows more specific information to be used as input for determining the feasibility of a personnel transfer. There are many unknowns resulting from fluctuating operating environments, but the basic constraints and restraints are in place. Complexities such as refueling, multiple transporting vessels, increased ranges, and a combination of shore- and sea-based staging areas give rise to decision variables that can be further incorporated with development of a more complex model in the future.

Conditions for a Marine Corps VBSS team transfer to a target ship will likely be analyzed on a case-by-case basis. The CH-46 helicopter can carry an entire 14-person team and equipment, but if that is not available then the parameters will need to be adjusted. The supply ship could be a standard amphibious vessel, as analyzed in this thesis, or a land-based staging area, in which case the target ships would be the only adjustable variables. In each case, however, the range of the chosen form of transportation will likely determine the feasibility of the transfer.

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V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

A. SUMMARY

The mission of VBSS plays an important role in the security and stability of any region in which it is conducted, and because this mission's significant importance it needs to be undertaken with the best options available. Even though there were no successful pirate attacks in 2013 there have already been several in 2014 (Millen, 2104). Currently, VBSS teams consisting of Navy sailors are primarily responsible for this mission, even though the training falls outside of most of their career paths. It would be more effective to incorporate the VBSS curriculum into the training pipeline of an infantry Marine.

Even though the number of ships since 2010 have decreased by 10%, the amount of days spent underway have increased by 15% (Rank, 2012). Navy ships are being required to spend more time on deployment as well as shorten the amount of time spent in port. The Fleet Replacement Training Plan does not change, and ships with shorter in-port periods are not exempt from certifications (Thomas & Hunt, 2012). Due to the rigorous turn-around time periods, it is necessary now more then ever to ensure that priorities on training are clear. When VBSS training needs to be conducted it should be the priority just like flight quarters or fire fighting, but as studies have shown, it is not given the same level of importance. Marine Corps manning has decreased during this time as well, however, the priority of training for Marines is more closely aligned with VBSS training. Close order combat training and Marine Corps Martial Arts Program could be integrated more easily with VBSS training.

B. CONCLUSIONS AND RECOMMENDATIONS

1. What alternatives are available to conduct VBSS in the U.S. Navy?

a. Conclusions

The Marine Corps has the appropriate qualitative manpower and training programs available to execute the VBSS mission, and doing so would bring them back to their roots of serving in a maritime security role. The 2015 Quadrennial Defense Review

outlines a drastic cut in manpower for the Marines, and research is being undertaken to remodel the current force structure into smaller units (Hagel, 2014). Reassigning the VBSS mission to the Marines not only increases readiness in that warfare area, but it also aligns with the national strategy and priorities. Some research has concluded that the Marine Corps of the future will be very different from what it is today and will consist of several modular units that are flexible and highly trained to a specific mission. This research supports the idea of including VBSS units among the many force packages (Bedell, 2012).

Marines already have an extensive training pipeline for VBSS. Because this training is currently used to train Marine Special Operations Command (MARSOC), it would only need to be altered slightly to accommodate the increased requirement of Marines. MARSOC has an existing Maritime Raid Force (MRF) that carries all of the same qualifications as a VBSS team, plus the ability to conduct opposed boardings and helicopter delivery ("24th MEU's Maritime Raid Force Marines Conduct Realistic Urban Training," 2014). The MRF operates under the Marine Expeditionary Unit (MEU), which deploys onboard Navy amphibious readiness groups. In 2010, the *USS Dubuque* (LPD-8) and the 15th MEU conducted an exercise in Maritime Interdiction Operations in which the Reconnaissance Platoon boarded a noncompliant vessel and neutralized the threat while the Navy VBSS team boarded (Orrell, 2010). Commander U.S. 3rd Fleet at the time, Vice Admiral Richard W. Hunt said, "This exercise has been very successful, this will provide additional VBSS capability for our maritime forces in the future." In 2014, Marine special operations forces conducted VBSS training in an exercise called Raven (McKee, 2010). An exercise officer stated "The teams don't have to learn many new skills to be able to conduct a VBSS mission, once on the ship it is relatively the same as a direct action mission on a house" (Lee 2014). The officer also stated:

> VBSS is not a new operational concept to MARSOC and these types of missions tie back to the amphibious roots of the Marine Corps. We may not have been doing these sorts of operations to date, but if you look at our roots and where we came from, VBSS is something we need to be prepared to do. (Lee, 2014)

The Marines have also been training in the VBSS mission with the Coastal Riverine Squadron in an exercise called Bold Alligator. Lt. j.g. Kristopher DeVisser was an assistant boarding officer during this event and said, “Bold Alligator is intended to improve Navy and Marine Corps amphibious core competencies” (Aldape, 2014).

b. Recommendations

It is recommended that Commander Naval Surface Forces, N96 (Surface Warfare Directorate), N95 (Expeditionary Warfare), and U.S. Marine Forces Command, liaison in order to turn over the roles and responsibilities of the VBSS mission to the U.S. Marine Forces Command.

Sailors are trained in specific ratings so that they have the skills necessary to keep equipment working and to maintain their watch at high level of readiness at all times. Relieving the Navy of the VBSS mission will allow ships to prioritize training and schedules to be more appropriately aligned with given instructions.

Just as sailors are specifically trained, so are the Marines, and for just as important, but different, reasons. The specialties that the infantry Marines are trained for would bring much-needed support to the VBSS mission area. With all of the options that have been explored in the studies cited previously, the Marine Corps mission and training more closely relates to VBSS than the training of Navy sailors.

2. What is the appropriate quantity and quality of Marine manpower to compose a VBSS team?

a. Conclusions

The Marine Corps already has a training pipeline in place for the Maritime Raid Force (MRF). Using the curriculum for the current Navy VBSS training program, MRF training can be altered to meet both requirements. The MRF is composed of the Marine Occupational Standard (MOS) 0300, which has a complementary training pipeline to the VBSS curriculum. The Marines that graduate from the school of infantry (SOI) will already have a strong base of knowledge and ability to be trained to conduct VBSS boardings (“Maritime Raid force,” n.d.).

There is no evidence to support the need for a change in the structure of the current VBSS team. As stated previously, exercises have already been conducted with an integrated Navy and Marine Corps team; Navy personnel could just be replaced with Marines for the proposed model to work. One downside to this is the loss of diversity in skills on the team, which can be a benefit (Rank, 2012). The supporting forces on the ship control team, which can relay instructions to get the VBSS team through an unforeseen circumstance, can overcome this.

b. Recommendations

The research recommends assigning an Intelligence Exploitation Team (IET) to each VBSS team to gain intelligence that may be otherwise overlooked by the Marines. There are about 180 intelligence specialists from the Navy Expeditionary Intelligence Command (NEIC) Forces, which has MIO IET as a primary mission area. When paired with a fleet VBSS team, the NEIC MIO-IETs are required to be fully mission capable. According to statements from the Projected Operational Environment (POE) for MIO-IET:

> NEIC MIO-IETs are comprised of deployable eight-man teams capable of task organizing (in part or in whole) to conduct intelligence exploitation operations directly supporting the JFMCC or NCC requirements (NEIC ROCPOE).
>
> MIO-IET specific collection and exploitation skills include civil maritime expertise, DOMEX, interrogation, monitoring techniques, theater familiarity, and targeting. Team members are certified to conduct VBSS level I/II boardings (NEIC ROCPOE).
>
> Deploying a MIO IET with the MEU in order to supply each Marine VBSS Team with intelligence specialists will greatly enhance the overall efficacy of AAV's and IPATS. (Scott, 2010)

Also, because this command's operational environment includes conducting both seizure and boarding operations, the personnel are already trained. This will make the transition less costly and easier to carry out as compared with a unit without an established training pipeline. The requirements for the potential operating environment are shown in Figure 12 (Scott, 2010).

EXW 15	**CONDUCT BOARDING OPERATIONS.**	
EXW 15.1	Conduct consensual boardings on suspect vessels (VBSS level I). L - Integration into a fleet VBSS team required for full capability.	**L**
EXW 15.2	Conduct non-compliant boardings on suspect vessels (VBSS levels II/III). L - Integration into a fleet VBSS team required for full capability. L - Limited to level II only.	**L**
EXW 15.7	Conduct initial safety inspection (ISI). L - Integration into a fleet VBSS team required for full capability.	**L**
EXW 15.11	Conduct extended ISI when there is a reasonable suspicion of a particular hazard that may threaten the boarding team. L - Integration into a fleet VBSS team required for full capability.	**L**
EXW 15.14	Conduct tactical room/space entry to resolve reports of unaccounted for personnel, stowaways and other situations involving potential terrorist/criminal activity. L - Integration into a fleet VBSS team required for full capability.	**L**
EXW 15.15	Plan/direct boardings operations. L - Intelligence support to planning and integrated participation in operations.	**L**
EXW 16	**CONDUCT SEIZURE OPERATIONS.**	
EXW 16.1	Conduct independent seizure operations. L - Intelligence support to planning and integrated participation in operations.	**L**
EXW 16.2	Support prize crew for a single seized vessel (less than 50m in length/less than 300 gross tons). Note: IET stays with seized vessel to maximize intelligence collection.	**F**
EXW 16.3	Plan/direct seizure operations. L - Intelligence support to planning and integrated participation in operations.	**L**

Figure 12. POE Requirements for MIO-IET

3. Using an analytical approach, can Marine VBSS teams be efficiently transported to ships that are assigned a VBSS mission?

a. Conclusions

The outcome of this analytical approach allows for more specific information to be input in order to determine the feasibility of a personnel transfer. There are many

unknowns due to a fluctuating operating environment, but the basic constraints and restraints are in place. The complexities such as refueling, multiple transporting vessels, increased ranges, and a combination of shore based and sea based staging areas, give rise to decision variables can be further incorporated with development of a more complex model in the future.

Modifications such as originating points being onshore can easily be incorporated into the analytical approach described in this project. Ground vehicles and aircrafts will have their own feasibility conditions; however, they can be derived based on the primary feasibility conditions (1)–(4) given here. The ground transportation capacities may prove to be a bottleneck in such modifications.

This research has produced three different courses of action (COA). The first COA is to reassign the VBSS mission to the Marine Corps, and keep the teams with their MEU onboard afloat units and deploy to other ships as needed. The second COA is to reassign the VBSS mission to be manned, trained, and equipped by the Marine Corps using shore-based units that will deploy to ships as needed. The third COA is to maintain the status quo with the Navy manning, training, and equipping VBSS teams.

b. Recommendations

COA 1 is recommended because it would allow for the transition of the VBSS mission to the Marine Corps with the fewest actual changes and least amount of cost.

COA 1

This course of action would mean reassigning the VBSS mission to Marines from deployed MEUs, but the teams would be kept aboard their amphibious ship in the ESG and then be transported from their home ship to other ships. No additional personnel would be added to the MEU to support this mission; instead, Marines that are currently stationed with the MEU will be provided additional training to conduct the VBSS mission exclusively. This option solely involves an adjustment in manning and does not require any changes in manpower.

(1) Strengths of COA 1

Keeping the Marines onboard the amphibious ships will not add any more costs to what already exists. Marines could also use the shipboard environment for more realistic training while waiting to be sent to a ship to conduct the actual VBSS missions. Keeping them with the MEU also allows for more flexibility when planning contingency operations, such as an amphibious assault. If the Marine VBSS teams are ashore when this planning begins, then additional logistical steps must be taken to get them onboard before the assault; otherwise, there will be fewer personnel to carry out the mission. This could affect the safety of the MEU.

MEU's already deploy with a Maritime Raid Force (MRF) that is trained to conduct all levels of VBSS boardings. The training pipeline is already in place it would just need to be expanded to allow for a larger force, and they have already been successfully operating onboard amphibious ships.

(2) Weaknesses of COA 1

Having an asset that needs to be transported from ship to ship is going to require more extensive logistics then an organic asset. The extra effort that is required to move a Marine Corps VBSS team can be considered a hindrance and make the execution of the mission less flexible. However, once the Marine VBSS team is onboard the ship that is required to carry out the VBSS mission is more capable to conduct different kinds of opposed boardings as well as helicopter insertions. Another weakness is the culture shift that would need to occur. Cruisers and Destroyers are not accustomed to having Marines onboard during deployment and space is limited. Common spaces would be more crowded and lines for meals would be longer so this will require some patience on behalf of the ship's crew and the Marines temporarily stationed onboard during the transition.

COA 2

Another option would be to train the Marine Corps to conduct the VBSS mission exclusively and then deploy these VBSS teams to ships from shore stations such as Bahrain. This can be done two different ways: train special teams that are not attached to MEUs and their primary job is VBSS, or train special teams attached to MEUs and then

send those teams ashore during the MEU deployment. Because the first option of using a special unit not attached to an MEU is more of a manpower issue and not a manning issue, that option is not be explored further. Manpower would require additional personnel, whereas manning would only require a reallocation of current personnel.

(3) Strengths of COA 2

The Marine Corps trains its members for close quarters combat from the beginning and throughout their training continuum, and there is already a training program for an MRF, which is similar to VBSS training. Only minor changes in training would be needed to have a complete Marine Corps VBSS training. While based on shore, the teams can conduct daily training because there will be no other requirements for them to fulfill. This will allow for a higher level of readiness than the Navy VBSS teams could perform.

Having the teams ashore, waiting to deploy to ships tasked with a VBSS mission allows for fewer steps in the logistics chain. When these teams are needed, they are in one place and can be called upon at any time. Also, while they are ashore, there would be no other requirements for them, so they could maintain a constant state of readiness.

(4) Weaknesses of COA 2

Stationing military members ashore comes with higher cost resulting from housing and food when compared with keeping them aboard a ship. Because it is desirable to avoid cost increases, this is a major weakness. Training is also important for consistently successful VBSS missions, and although teams would be able to train ashore, the training would be more realistic at sea. Another potential weakness is the VBSS unit may become too isolated from the MEU and start to identify more with the shore-based unit. This may decrease the MEU's overall cohesiveness.

COA 3

This thesis, along with previous research, has thoroughly examined the Navy's VBSS program to fully understand how the program is manned, trained, and equipped. The manning of VBSS teams is arbitrary and usually based on the physical condition of a

sailor. The VBSS evolution is temporarily manned, which means it occurs in addition to a sailor's regular watch standing and productive work. The current training program by the Center for Security Forces has proven to produce quality VBSS members, but maintaining this skill set while back onboard the ships in a training environment is not occurring. Maintaining the status quo is an option, but there are many points to consider.

(5) Strengths of COA 3

The main strength of keeping an organic VBSS team onboard each ship is flexibility because it allows fleet commanders the ability to direct a ship to react at a moment's notice in the event of an emergency. Mitigation to the potential loss of this ability is to continue to train all sailors upon check-in with the Ships Reaction Force-Basic School so they have the skills to defend the ship while in port. Ships should also continue to send a group of select sailors to the SRF A School to learn how to react in an emergency (such as an intruder onboard the ship or any pier-side attack). This will allow ships forces to maintain a ships reaction force team (SRF) and backup reaction force team (BRF) to exclusively protect the ship.

There is also flexibility in the diversity of the Navy team members. Whereas a Marine Corps VBSS team would be all infantry marines who were trained in the same way throughout their careers, Navy VBSS teams have a variety of ratings, from engineering to information technology to culinary specialist. These diverse skillsets can be useful when the team faces unexpected challenges while boarding an unknown ship (Rank 2012). Because there will continue to be a requirement for a shipboard support team, these skills will not be lost with a Marine Corps VBSS team; instructions could be transmitted over radio instead.

(6) Weaknesses of COA 3

The highly technical mission of the Navy requires highly trained technicians, and while being trained to operate and fix the world's most complex military equipment, there is little time for the combat training that VBSS requires. These skills can be taught in VBSS schools, but maintaining them requires time that the ship's schedule cannot allow for because of maintaining the ability to perform technical skills takes precedence.

There are drills that the VBSS team must accomplish to maintain their proficiencies, according to the *Surface Force Readiness Manual*, but as stated previously, only 5.1% of sailors reported the ability to participate in these drills on a regular basis (Ray 2010).

Not only is time a scarce resource, but also the personnel to serve on these VBSS teams are limited. Typically, personnel are pulled from their watch stations to participate in this special evolution. The ships are manned by allotting each sailor 8 hours of watch per day; when a sailor is taken out of this rotation, others must do more to fill the gap. Ships are deploying more frequently, and approximately 43% report that they spent 3 or more months conducting VBSS missions (Ray 2010). The personnel that were trained to perform in specific watch stations should instead be concentrating on those watch stations to maintain proficiency and keep the ship at the highest level of readiness.

C. FURTHER RESEARCH

The outcome of this analytical approach has provided a framework for future studies with the input of more specific information. Variables such as range, capacity, and alternative forms of transportation can be added to make the outcome of the analysis more specific to a situation. Also, more constraints—such as the weight of various equipment load outs and sleeping space onboard smaller ships—can be added to narrow down the outcome as well.

Previous research has shown there are issues with mental and physical fatigue due to the long duration of VBSS mission onboard the Rigid Hulled Inflatable Boat (RHIB). They do not have appropriate seating for all members of a VBSS team, so there is not support for the long-term impact of waves. There are newly designed RHIBs in use by the Coast Guard and some special forces units that would be much better for the Marines to use while conducting VBSS missions. Combining the logistics of moving these new RHIBs and the Marine VBSS teams into a new model would add to the safety and effectiveness of VBSS missions.

When the range and capabilities are kept within the given parameters, Marine VBSS teams can be transported relatively efficiently. Transporting Marine Corps VBSS teams from ship to ship may not be outwardly efficient because the Navy already has a

program to man, train, and equip its own teams. However, the improvements in readiness for both the VBSS mission and the ability for ships' crews to direct more attention to higher priority missions such as Air Warfare or Ballistic Missile Defense will outweigh the perceived inefficiencies of transporting the nonorganic Marine Corps VBSS teams.

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APPENDIX. VBSS SCHOOL DESCRIPTIONS

School	Description
SRF Basic	Course graduates will be able to perform the duties and responsibilities of an armed sentry for controlling access to U. S. Navy assets. Students will learn to implement immediate actions to identify, assess, track and deter potential threats, utilizing and demonstrating the proper tactics, techniques and procedures of the Use of Force Continuum along with proper implementation of Force Protection procedures, watch standing techniques and be capable of interacting with security reaction forces as a basic reaction force team member. This is a High-Risk course of instruction, and training consists of Oleoresin Capsicum (OC) pepper spray as well as live fire of the 9 mm pistol, 12-gauge shotgun, and M-16 rifle. All courses of fire used for this course are specified in OPNAVINST 3591.1F
SRF Advanced	This course allows personnel to perform as a Naval Security Force team member. This team will act to prevent threats, whether from the pier, small boat, or any other means of penetrating a unit. This course will also train personnel to perform as a Naval Security Force team leader. In this position, the Team Leader will manage a security force team through assignment of members, ensure members receive necessary training, and coordinate team responses and perimeters. The Team Leader will also be able to conduct briefs and debriefs for the team and the Chain of Command. Course includes Operational Risk Management; Tactical Team Movements; Tactical Team Leadership; Tactical Communications; Use of Force and Deadly Force; Personnel Restraint Devices; Force Protection Search Procedures; Tactical Team Management; Tactical Mission Planning; and Standard Operating Procedures. Instructors will have to meet the Navy qualifications on the 9mm pistol and re-qualify semi- annually in accordance with OPNAVINST 3591.1F
VBSS NCB	This course is designed to prepare Shipboard Boarding Teams and Boarding Officers (BO) to perform Visit, Board, Search, and Seizure (VBSS) procedures (Compliant and Non-Compliant Low Freeboard) in support of Maritime Interdiction Operations (MIO). The course provides Safety; Water Survival; Use of Force/Deadly Force Policy; Physical Training/Defensive Tactics; Equipment Familiarization/Gear Issue; Compliant Boarding; Non-Compliant Boarding; Knot-Tying Techniques; Service Pistol, Rifle, and Shotgun Tactical Shooting; Caving Ladder Climbing; Rappelling and Containerized Inspection; Tactical Movements; Document Inspection, Verification and Intelligence Gathering; Underway Ship Boarding; Non-Lethal Weapons; Mission Planning; Effective Communications; Combat First Aid; and Prisoner Escort. The culmination of this training is an evaluated non-compliant boarding scenario involving boarding an afloat target. This course is designated as High Risk.

VBSS BO	This course prepares the VBSS Boarding Officer (BO), Assistant Boarding Officer (ABO), Security Team Leaders (STL), Liaison Officer and Intelligence Specialist (IS) to plan, execute, teach the biometrics collection equipment, and debrief VBSS procedures (Compliant and Non- Compliant Low Freeboard) in support of Maritime Interdiction Operations (MIO). This course is designed for the BO/ABO/STL to attend prior to attending the NCB VBSS (A-830–0395) course. The course consists of both classroom and laboratory instruction, and includes: Safety, Documentation Review, Vessel Inspection (Cargo and Personnel), Identification and Management of Threats and Hazards, Evidence and Intelligence Information Collection and Documentation (Chain of Custody), Training Management, Collection of Biometrics, Management of Emergency Medical Incidents and Boarding Team Decontamination Procedures, Mission Planning, and New Technology in support of Maritime Interdiction Operations (MIO). Graduates also receive instruction on UN resolutions, pre-boarding procedures to include vessel queries and threat profiles, compliant and non-compliant boarding procedures, construction and submission of an After Action Report (AAR), and procedures for health and comfort inspections. This course requires a SECRET clearance.
Mechanical Breacher School	The Mechanical Breacher Technician course includes practical applications used currently by U.S. Navy SPECWAR and Non-Compliant Visit Board Search and Seizure Team Mechanical Breaches, as such, this course has an additional emphasis on Maritime Interdiction Operations, also providing practical training in breaching metal doors and walls, bulkheads and hatches, to wooden doors and entry ways. The Mechanical Breaching Technician course will provide training in the use of 1) Manual Breaching Tools and Techniques, 2) Mechanical Breaching Tools and Techniques, 3) Ballistic (Shotgun) Breaching Tools and Techniques and 4) Exothermic (Torch) Breaching Tools and Techniques.

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